

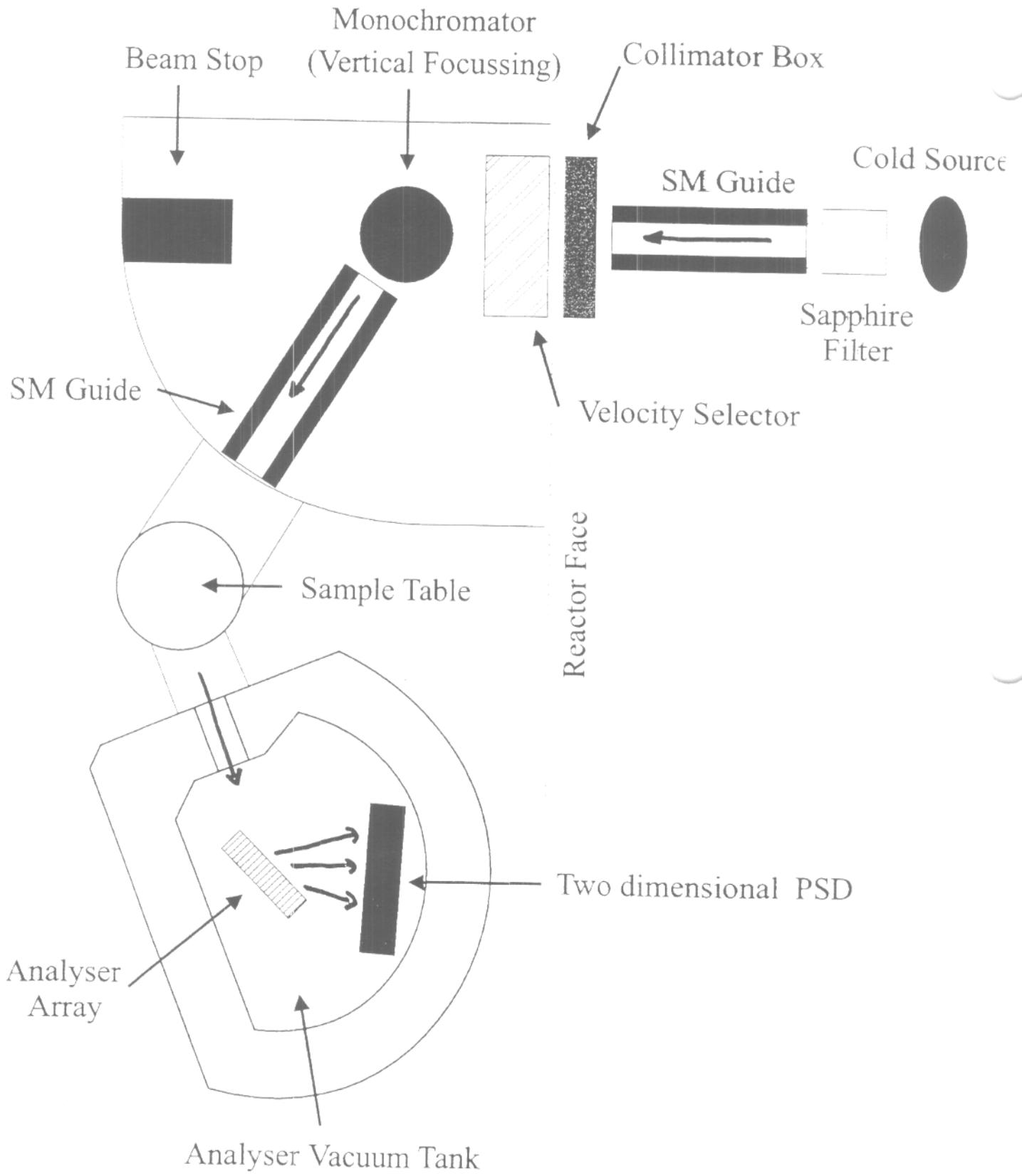
# RISØ

## **Presentation of the MicroStrip Gas Counters developed at RISØ.**

by Karen Enevoldsen  
Risø National Laboratory

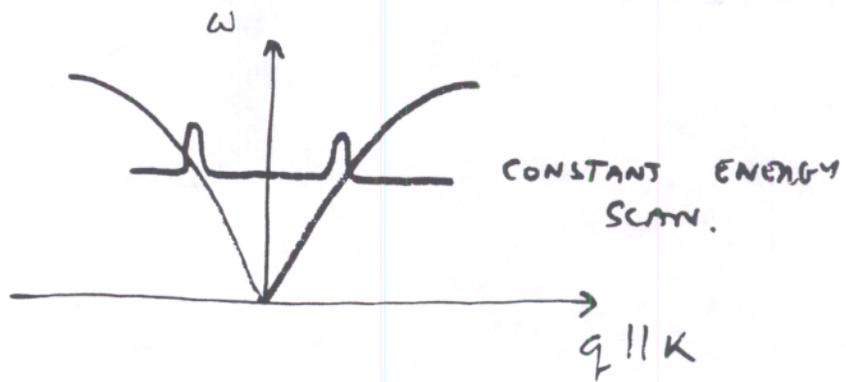
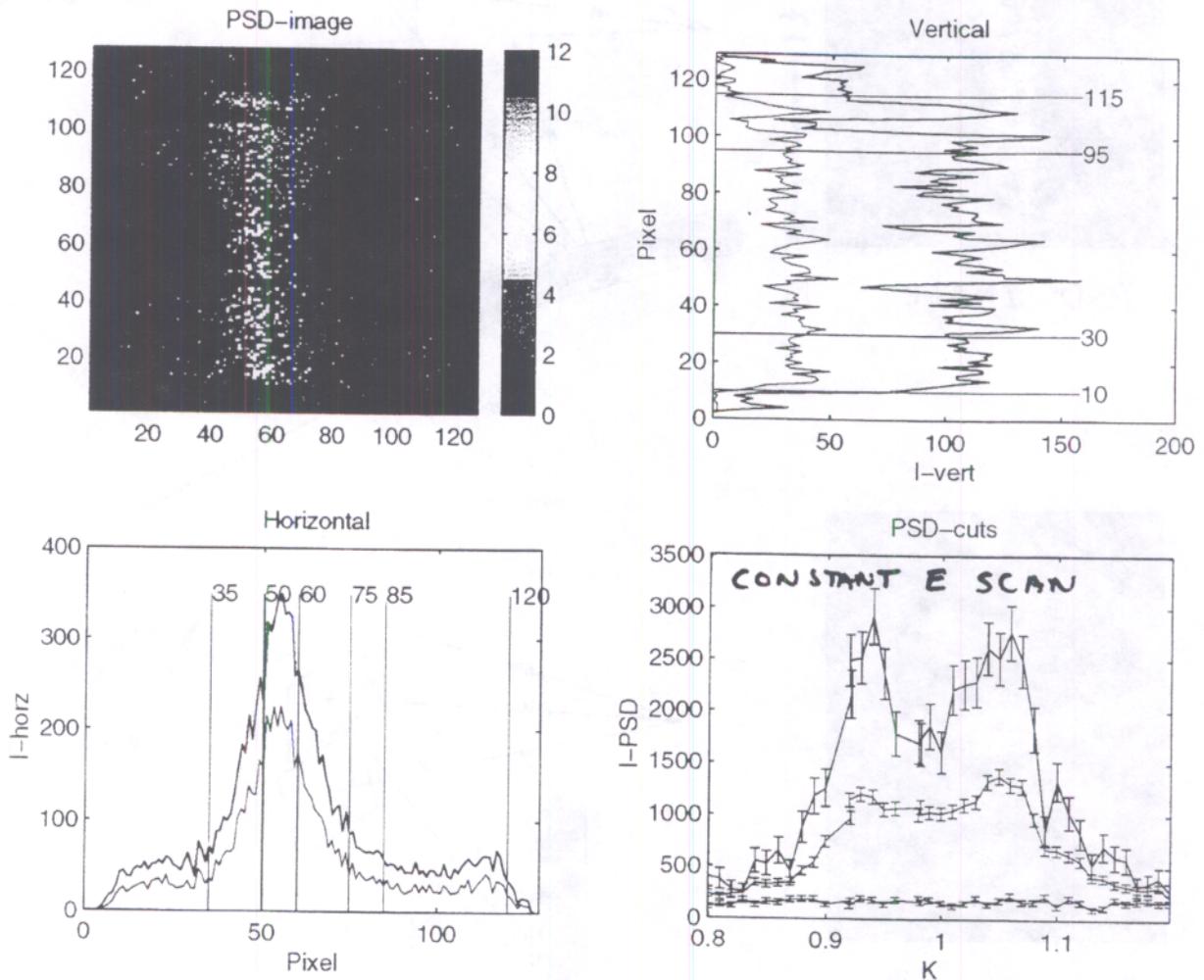
A two dimensional microstrip gas counter for neutrons are described. Uses of the detectors at Risø as well as some performance results are presented.

# RITA

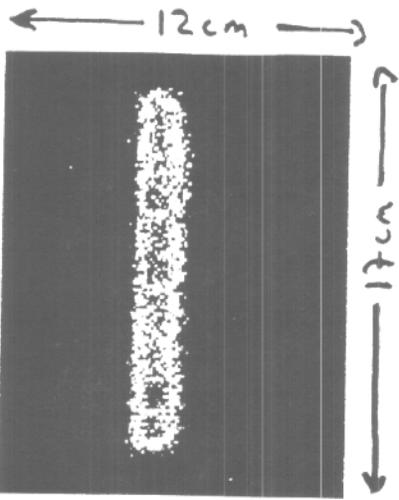


# OPTIMISING S/N AND RESOLUTION

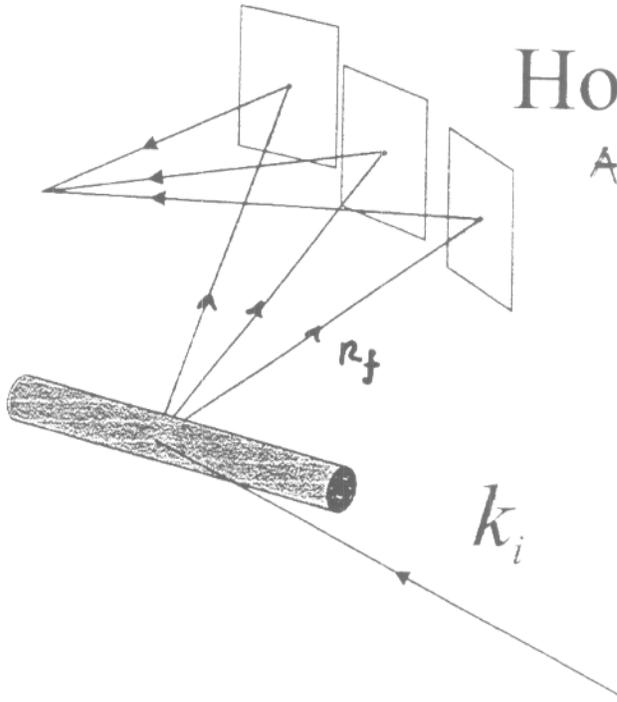
## INELASTIC SCATTERING FROM CFTD



# Focussing 2D Fluctuations



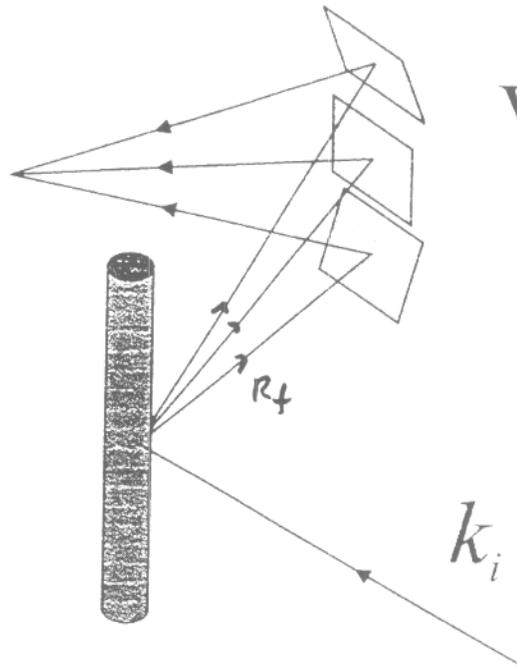
PSD IMAGE



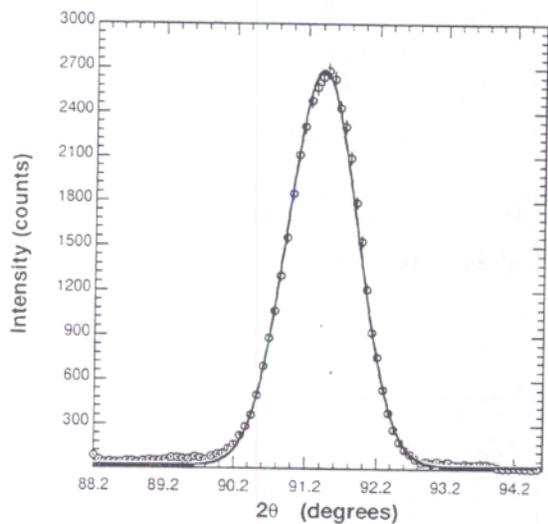
Horizontal  
ANALYSER



PSD IMAGE



Vertical  
ANALYSER



**cali523.dar 1**

/usr/users/tascom/data/tolo/calib523.dar 18/05 1998 11:03:37  
 RISOE TAS-8 1994 PSD-MODE

File head parameters:

2T	LF	PRSC	PRES	TIM	MON	TX
91.497	2.99695	0	10	0.044	499	0.0000 1
TY	TZ					
						1.5300 0.0000

Guess Par: (Int, Pos, FWHM, M) per peak + Background, Slope

2676	91.4600	1.00	200.00	9	0.0
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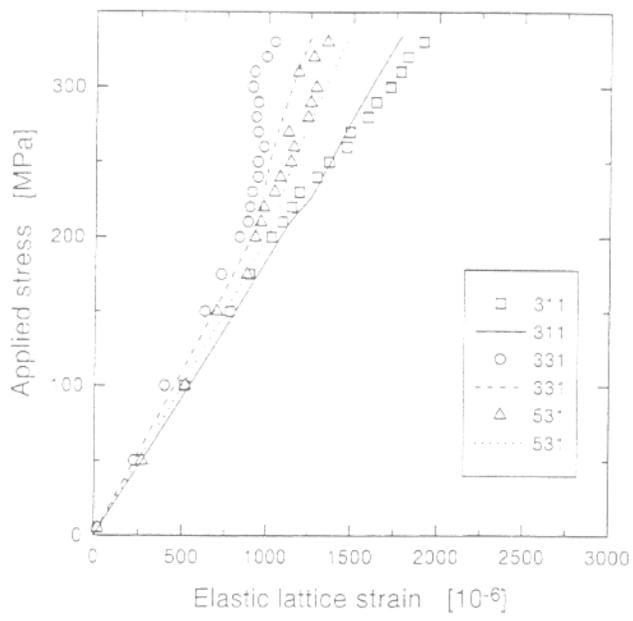
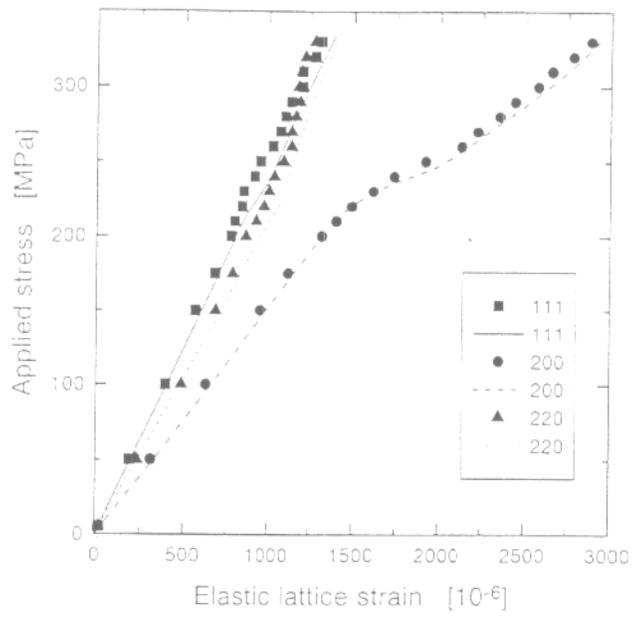
Final Fit Parameters Gaussian Fit

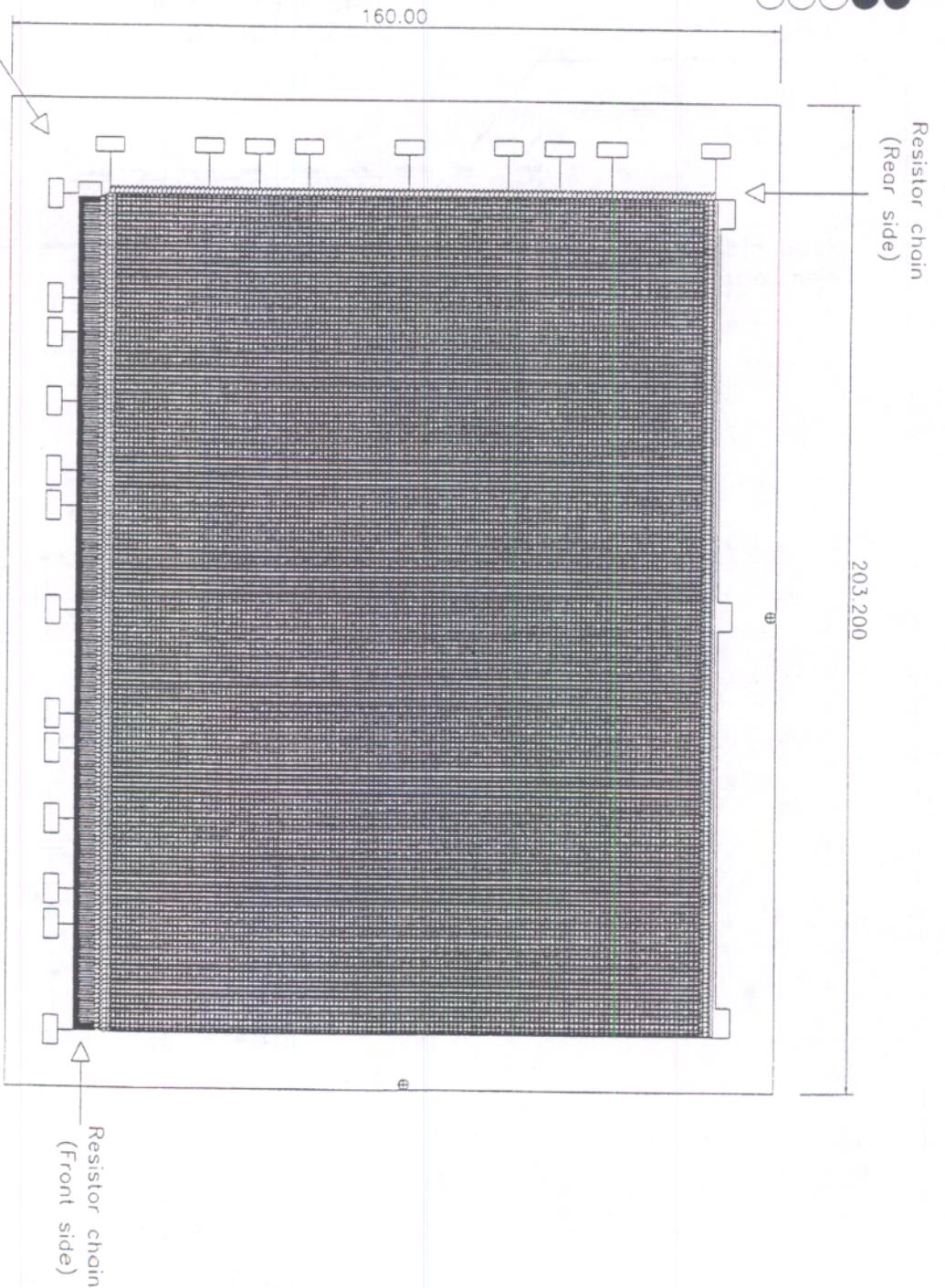
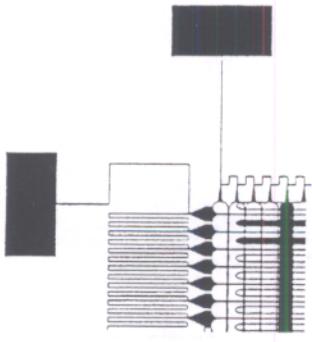
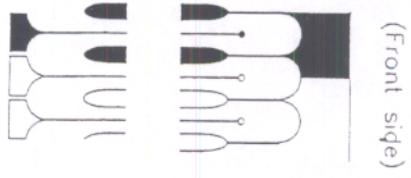
2666	91.3933	1.14	200.00	31	0.0
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Estimated Errors

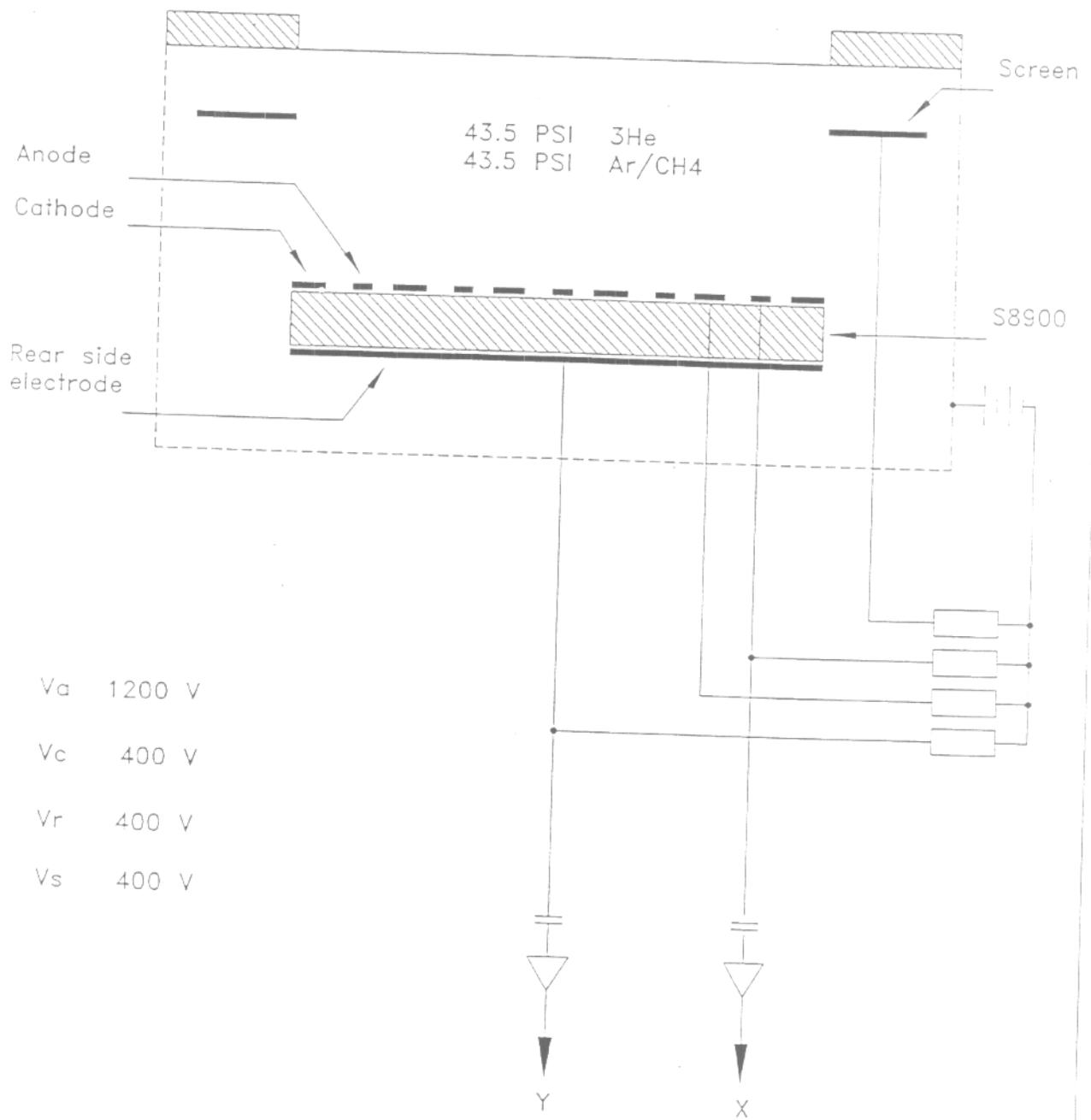
17	0.0025	0.00	0.00	1	0.0
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Chi Squared	Sin <sup>2</sup> (psi)	d-spacing	error
24.6918	0.000	0.000000	0.000000

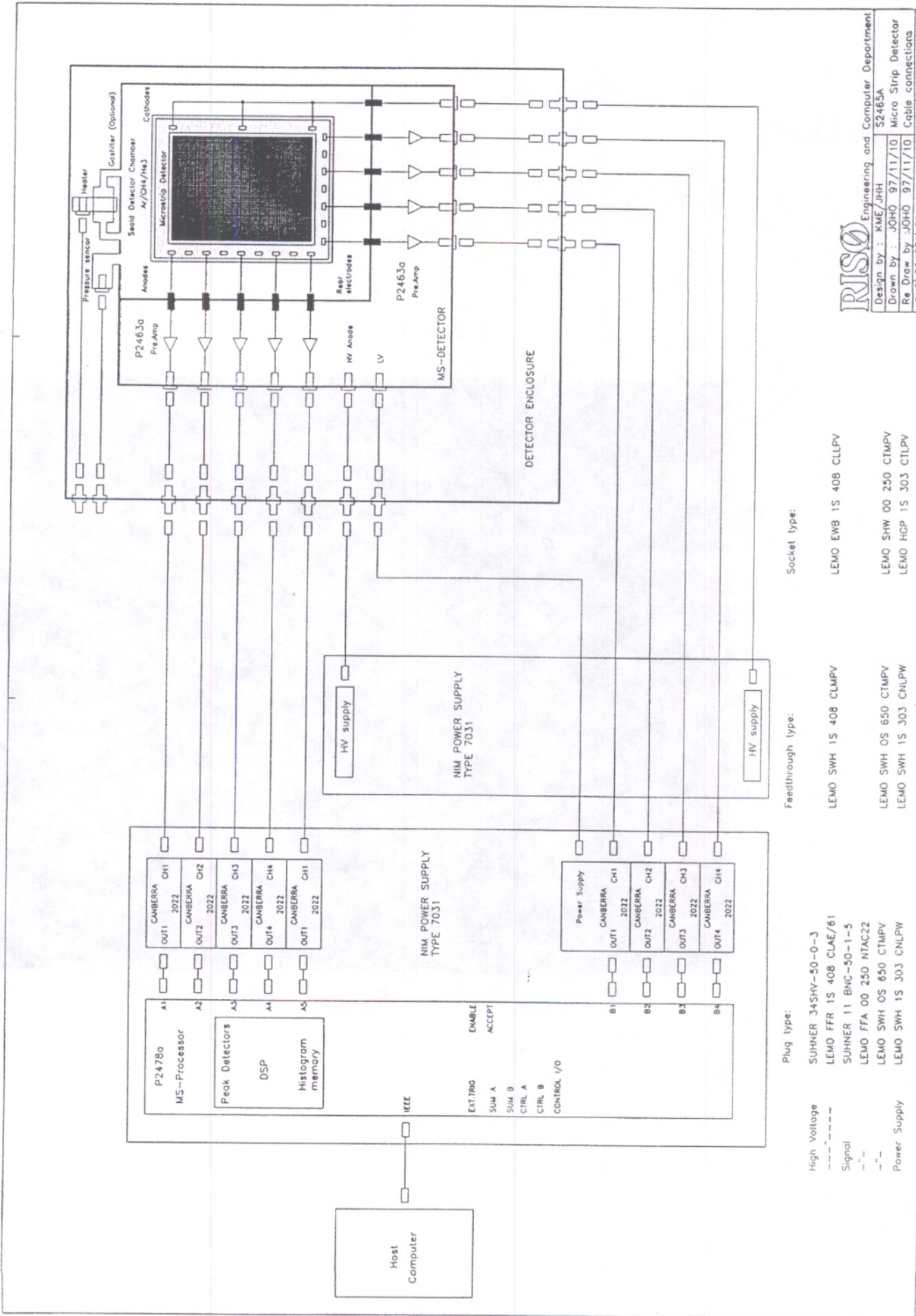




**RISO** Engineering and Computer Department  
 Design by : KME/JHH MSD01  
 Drawn by : JOHO 94/11/08 Micro Strip  
 Re Draw by :JOHO 94/11/10 Detector  
 JOHO\P2448A\NEW\MSD01.dwg sheet 1 of 1



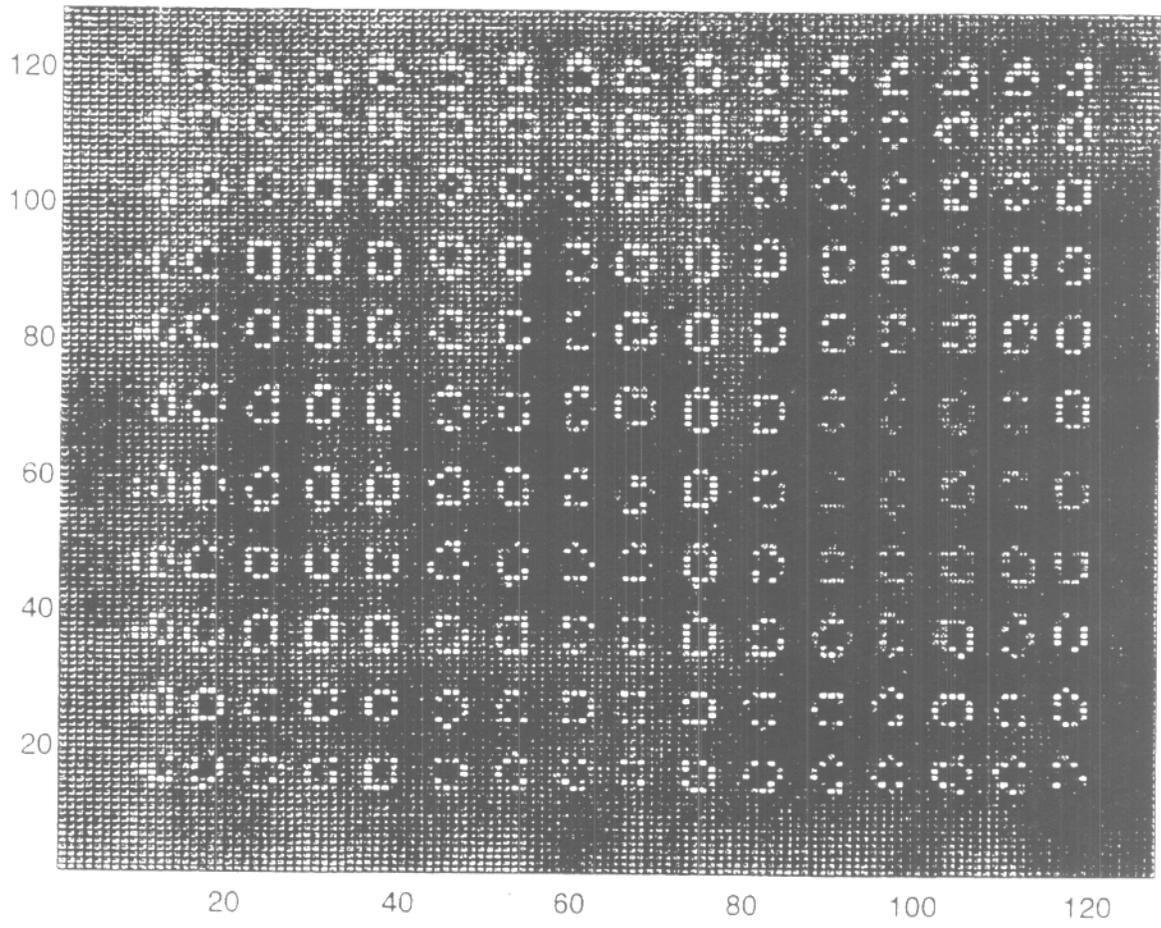
<b>RISO</b>		Engineering and Computer Department
Design by.	KME/JHH	P2448A
Drawn by.	JOHO 94/11/22	Signal Handling
Re Draw by.	JOHO 94/11/22	MS-Detector
JOHO\ P2448A\ P2448407.dwg		Sheet 1 of 1



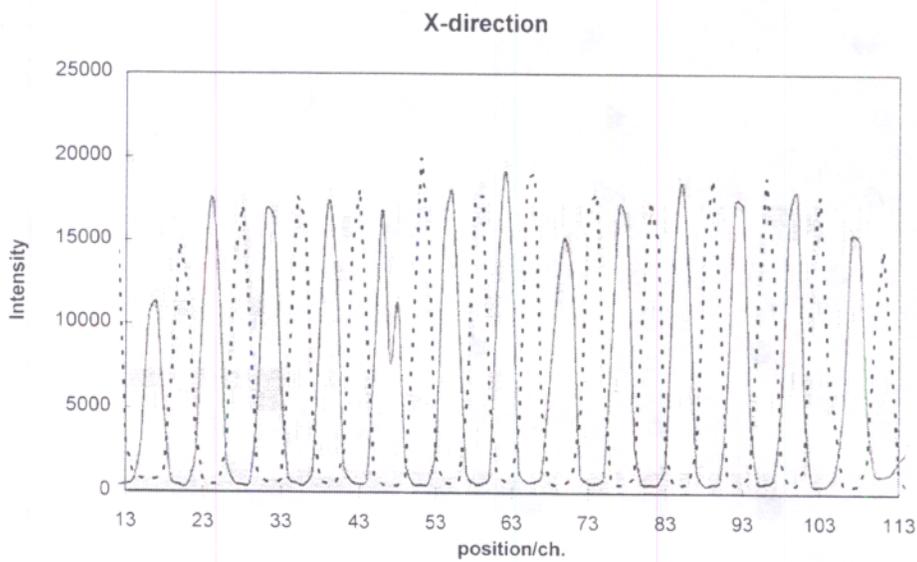
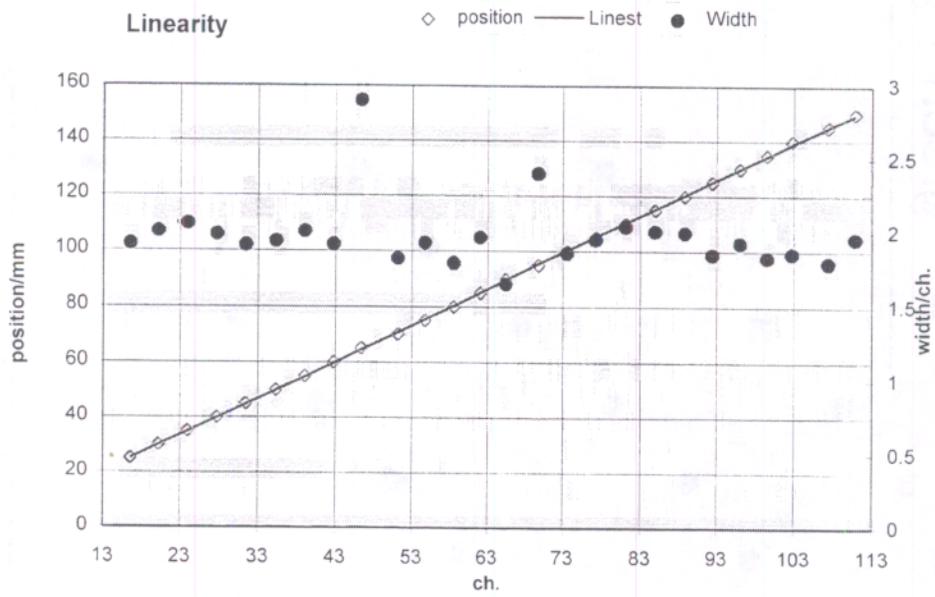
Plug type: SUHNER 345HV-50-0-3  
 High Voltage LEMO FFR 1S 408 CLAE/61  
 Signal SUHNER 11 BNC-50-1-5  
 LEMO FFA 00 250 NTAC22  
 LEMO SWH OS 650 CTMPV  
 LEMO SWH 1S 303 CNLPW  
 Power Supply

Feedthrough type: LEMO SWH 1S 408 CLMPV  
 LEMO SWH OS 650 CTMPV  
 LEMO SWH 1S 303 CNLPW

Socket type: LEMO EWB 1S 408 CLLPV  
 LEMO SHW 00 250 CTMPV  
 LEMO HGP 1S 303 CTLPV

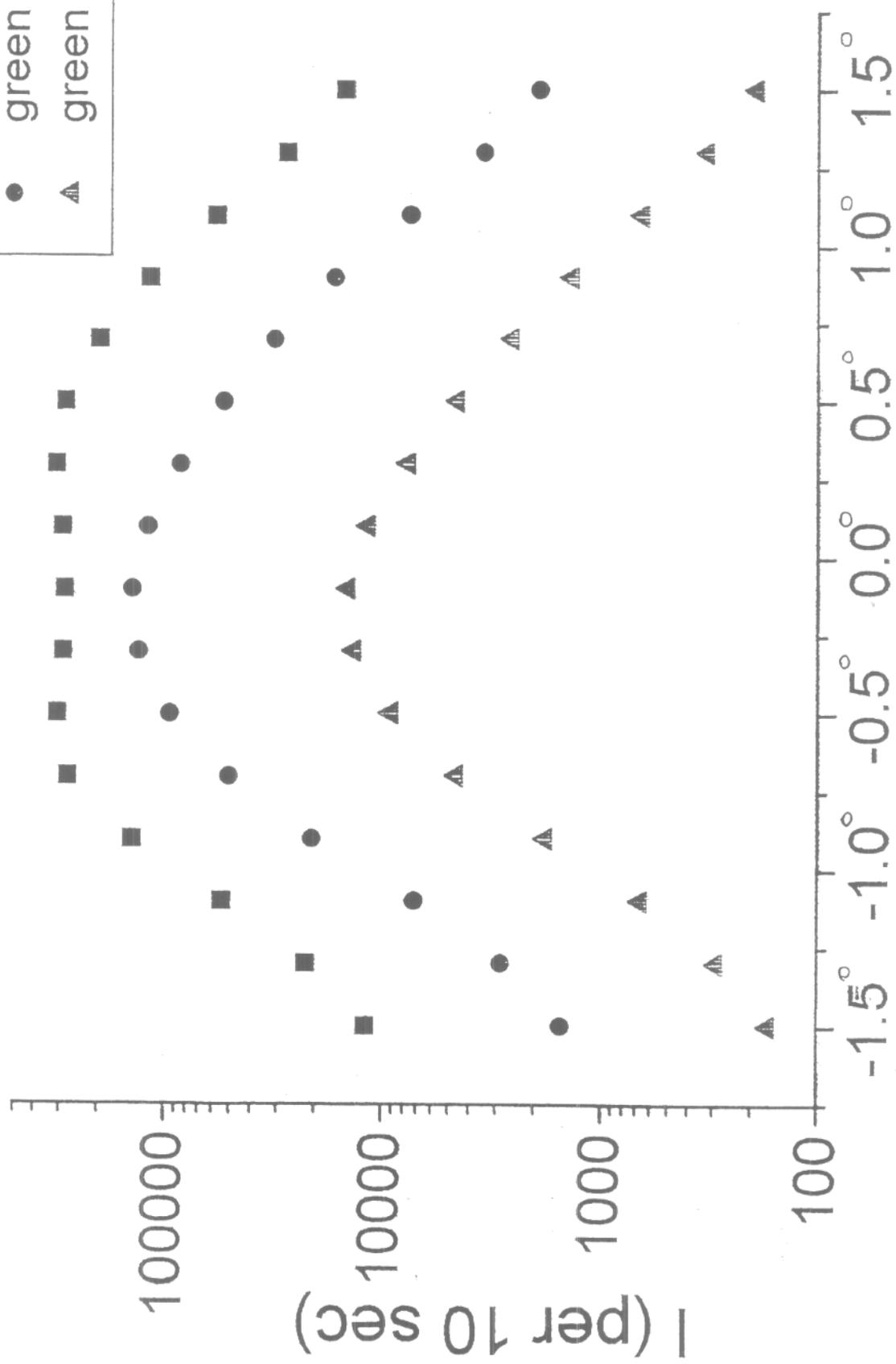
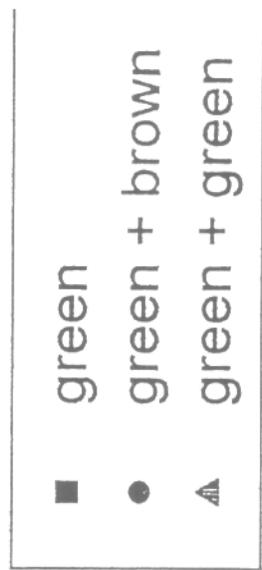


EXPERIMENTAL DETERMINATION OF THE PROPERTIES OF THE MSGC.



correl 0.9999  
 steyx 0.41 mm  
 mean W 2.5557 mm  
 max W 3.8274 mm  
 HWFM 3.0103 mm  
 HWFMc 2.8393 mm

Measured through a cadmium mask with holes of 1 mm in diameter.



QM

# Improvements

Higher count rates

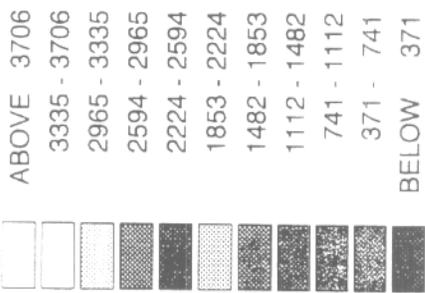
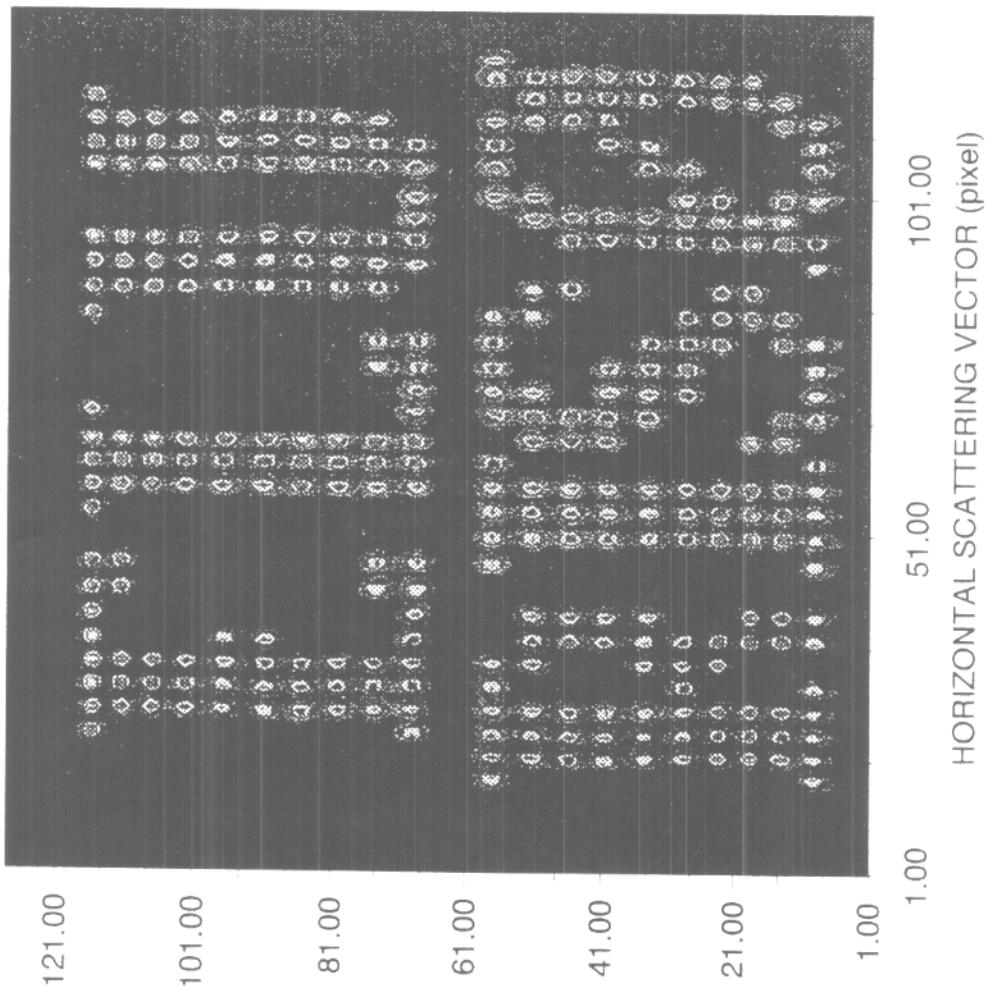
New plates with less resistance in the resistance chain.

No defects

New and better specified plates.

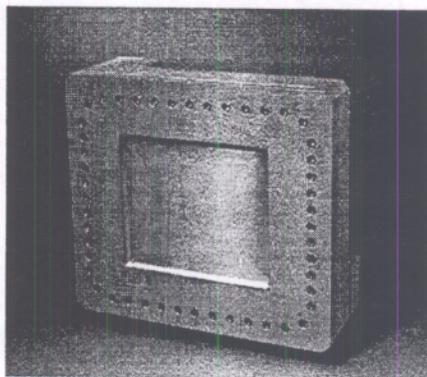
Better resolution

CF<sub>4</sub> as counter gas, new detector house.



## Two-dimensional Micro Strip Detector for neutrons

Detector body dimensions	310 · 360 · 124.8 mm <sup>3</sup> .
Material	Aluminium.
Window	170 · 120 mm <sup>2</sup> · 7 mm aluminium.
Active depth	30 mm.
Micro Strip plate	203 · 160 mm <sup>2</sup> double sided.
Substrate	S8900 Schott glass, 0.5 mm thick.
Anodes	10 μ wide gold strips, 1 mm pitch.
Cathodes	400 μ wide gold strips.
Rear side electrodes	900 μ wide chromium strips, 1 mm pitch.
Gas composition	3 bar <sup>3</sup> He and 3 bar of Argon with 10% CH <sub>4</sub> .
Gas volumen	282 · 213 · 40 mm <sup>3</sup> .
Spatial resolution	2.5 mm FWHM in the long direction and 3 mm FWHM in the other direction.
Detection efficiency	83 % at 2.5 Å neutrons.
Maximum counting rate	6000 neutrons/second at 10% dead time.
Operating high voltage	1.2 kV anode, 400 V cathode and rear side electrode.



### Principle

The incoming neutron is captured by the <sup>3</sup>He gas and the proton and triton from this reaction produces a track of ionised gas. The charge is drifted towards the micro strip plate, which is a substrate covered with an electrode pattern of 10 μm wide anodes and 400 μm wide cathodes. The charges are collected on the anodes after they have been amplified by the electric field around the anode strip. All the anodes are connected on the plate through a resistive chain. The ratio of the amount of charge collected at one end of the resistive chain to the total charge collected, is proportional to the position of the event. The charge collected on the front side is inducing a signal on the rear side, where 900 μm electrode strips perpendicular to the strips on the front side are connected to each other by a resistive chain and the position, in the other direction, is calculated in the same manner as on the front side.

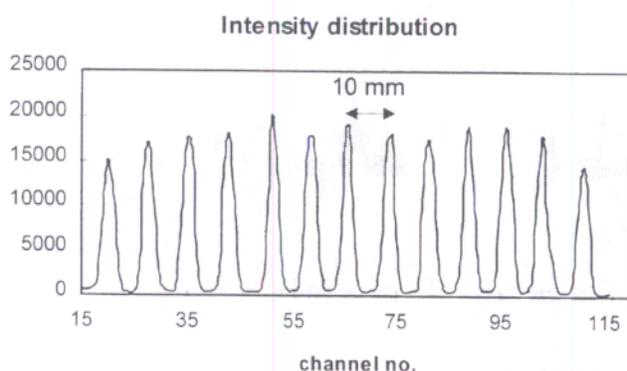


Figure 1 Spatial resolution in the long direction: Intensity distribution measured through a cadmium mask with 1 mm holes in 10 mm distance.



Figure 2 Neutron intensity measured through a cadmium mask.

### Signal processing and data acquisition.

The detector is read out in 9 points of the resistor chains, 5 on the front side and 4 on the rear side. The electronics consists of two high voltage supplies, 9 preamplifiers, placed at the detector, 9 main amplifiers and a Micro Strip processor which calculates the co-ordinates of the event and updates a histogramming memory. The memory content can be transferred from the MS-processor to a host computer through a GPIB interface.

